Environmentally important interactions between neptunium(V) and manganese oxide hydroxide minerals

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To further understand the fundamental chemical processes governing the migration of transuranic contaminants in the environment, we are currently investigating the interactions between neptunium and manganese oxide/hydroxides. Manganese oxides, present as minor phases in the vadose zone, have been previously shown to sequester large quantities of plutonium under environmental conditions [1,2]. We are now continuing these studies with neptunium(V). Sorption onto manganite and hausmannite has been studied as a function of neptunium concentration and pH. XAFS spectra taken at the neptunium L_{III} edge, have been used to determine the oxidation state of the interacting neptunium as well as a structural probe. Neptunium is expected to sorb to these mineral surfaces in an inner-sphere coordination consistent with other actinides. Our preliminary experimental results indicate interesting redox behavior in this system.

[1] Dawn Shaughnessy, *et al.*, Complexation and Redox Interactions Between Aqueous Plutonium and Manganese Oxide Interfaces, Actinides-2001 proceedings, in press.

[2] D.A. Shaughnessy, *et al.*, Molecular Interfacial Reactions Between Pu(VI) and Manganese Oxide Minerals Manganite and Hausmannite, submitted to Environmental Science and Technology.

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